

CLAIMS

What is claimed is:

1. A method of providing medium access control over an upstream channel in a communication network system serving a plurality of system users, having an upstream channel for carrying upstream messages from at least a subset of the plurality system users to a communication server and a downstream channel connecting said communication server to said system users of said subset, the method comprising the steps of:

(a) classifying upstream user messages as a type-one or a type-two message based on a predetermined factor wherein a copy of type-one messages will be distributed from a user of the subset of users to all users in said subset of users;

(b) for each type-two message defining a type-one message, as a reserve request, directed to all other users in the subset of users to reserve upstream channel usage to the sending user for sending a type-two message; and

(c) said users selectively buffering said messages such that type-one messages are buffered if a reserve message has been received and type-two messages are buffered until after its associated type-one message is sent and received by the other users.

2. The method of claim 1, wherein said upstream user message containing information to identify said message sender.

3. The method of claim 1, wherein said upstream user message containing information to identify the designated message receiver.

4. The method of claim 1, wherein said predetermined factor to classify type of message is based on the size of said message.

5. The method of claim 1, wherein said predetermined factor to classify type of message is based on the level of priority of said message.

6. The method of claim 3, wherein said type-two message designated receiver returns an acknowledge to said type-two message sender upon successfully receiving of said type-two message.

7. The method of claim 4, wherein said sending message using a standard packet cell data structure, wherein said message can be further segmented, encapsulated into a plurality of packet cells.

8. The method of claim 4, wherein the first packet cell of said multi-packet cell message contains the total number of packet cells for said message and each said packet cell having information to identify its packet cell sequence within the multi-packet cells.

9. The method of claim 2 whereby receiving a type-one message from downstream channel by said message sender serves as an acknowledgment to indicate that other users of said subset and said communication server successfully received said type-one message.

10. The method of claim 1, wherein said users buffering said messages for a pre-determined period of time after receiving a reserve request.

11. The method of claim 1, wherein said users buffering said messages for an optimal backoff time using an algorithm to calculate such backoff time each time said user completes an upstream transmission or receives a reserve request from other user of said subset, basing on a plurality of factors including the message round-trip propagation time, the size of last upstream message sent by said user, and the total number of current on-line users of said subset tracked by said communication system.

12. The method of claim 7, wherein said packet cell of said message further comprising at least one header portion and at least one data portion; wherein one designated bit of the header portion is set to identify said packet cell as a reserve request.

13. The method of claim 11, wherein tracking said total number of current on-line users of said subset further comprising:

periodically sending the first special message containing said total number of current on-line users of said subset by the last log-in system user into said subset;

monitoring said first special message for a predetermined period of time when a new system user first log-in said subset called a "log-in" mode;

said new system user receiving said first special message starting to send periodically a second special message having said total number of current on-line users of said subset incrementing by one;

10 stopping sending said first special message by said last log-in system user
once receiving said second special message from said new system user, said new system user
becoming said last log-in system user of said subset;

sending a third special message into said system by a system user ready to log-out said subset;

15 said last log-in system user receiving said third special message decrementing
 said total number of current on-line users of said subset by one; and
 resetting and recounting said total number of current on-line users of said

14 The method of claim 13, wherein resetting and recounting further comprising:

- issuing a recounting message by said last log-in system user;
- putting all said current on-line users of said subset into said "log-in" mode;
- said last log-in system user issuing said first special message having total number of current on-line user of said subset set to be one; and
- the rest of said current on-line users of said subset incrementing said total number of current users of said subset by successively becoming said last log-in system user.

15. The method of claim 11, wherein tracking said total number of current on-line users of said subset further comprising:
 - monitoring said total number at said communication server;
 - updating said total number when said communication server receiving a message sent by said system user becoming on-line or off-line;

periodically informing said on-line system users about said current total number of on-line users of said subset; and

if needed, said communication center reinitializing said total number of on-line users by requesting said on-line users of said subset responding to the recount request.

16. The method of claim 1, wherein said system further comprising:

grouping said system users into a plurality of subsets of users;

managing said subset of users by checking the type, the integrity of said sending message and the message traffic transmitting to/from said subset of users.

extracting a copy of said type-one message of said subset of users from said upstream channel and inserting it into said downstream channel connecting said subset of users; and

forwarding said upstream messages from said upstream channel to said communication server.

17. A CATV network system implementing medium access control mechanism, having a communication server, a downstream channel connecting said communication server with a plurality of settop users and carrying downstream messages and at least a upstream channel a plurality of settop users to said communication server and carrying upstream messages, the system comprising:

(a) means for classifying upstream user messages as a type-one or a type-two message based on a predetermined factor wherein type-one messages are communications by a user of the subset of users to other users in the subset of users;

10 (b) for each type-two message means for defining a type-one message, as a reserve request, directed to all other users in the subset of users to reserve upstream channel usage to the sending user for sending a type-two message; and

(c) means for said users selectively buffering said messages such that type-one messages are buffered if a reserve message has been received and type-two messages are buffered until after its associated type-one message is sent and received by the other users.

18. A CATV network system implementing medium access control mechanism, having a headend, a downstream channel connecting said headend with a plurality of settop users and carrying downstream messages, and at least an upstream channel connecting said headend with a plurality of settop users and carrying upstream messages, the system comprising:

(a) means for buffering the sending upstream message and classifying said message as a type-one or a type-two message based on a predetermined factor by the message sender;

10 (b) means for said message sender transmitting a copy of said buffered type-one message into upstream channel immediately, otherwise means for issuing a special type-one message, a reserve request, into said upstream channel immediately if said buffered message is a type-two message;

(c) means for transferring said type-one message directly from said upstream channel into said downstream channel;

15 (d) means for inducing other settop users received said reserve request from said downstream channel to refrain from transmitting into said upstream channels for a period

of time equal to the reservation time plus additional guard band;

20 (e) means for transmitting a copy of said buffered type-two message into said upstream channel by said reserve request sender once received said reserve request it sent form said downstream channel;

(f) means for responding by said headend by sending an acknowledge to said type-two message sender to indicate successfully of receiving of said type-two message;

(g) mean for removing said buffered type-two message from buffering by said type-two message sender received said acknowledge; and

(h) means for re-transmitting said message after a predetermined period of time if the number of retries has not exceeded a predetermined maximum retry count.

19. The system of claim 18, wherein an optimal backoff time is calculated every time for each settop user completing transmitting said upstream message or receiving a reserve request from another user, comprising:

5 (a) means for tracking the number of concurrent settop users in said communication system;

(b) means for tracking the size of last message sent by said sending settop user; and

(c) means for calculating an optimal backoff time by using said number of concurrent settop users, said size of last message and round-trip propagation time.

20. The system of claim 18, further comprising:

(a) means for grouping a plurality of settop users with a downstream transmitter

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between said headend and said settop users;

5 (b) means for grouping a plurality of users with a upstream transmitter between
said headend and said settop users; and

 (c) means for forwarding a copy of said type-one message from said upstream
transmitter directly to said downstream transmitter wherein said type-one message will be
received by said plurality of settop users grouped by said downstream transmitter.